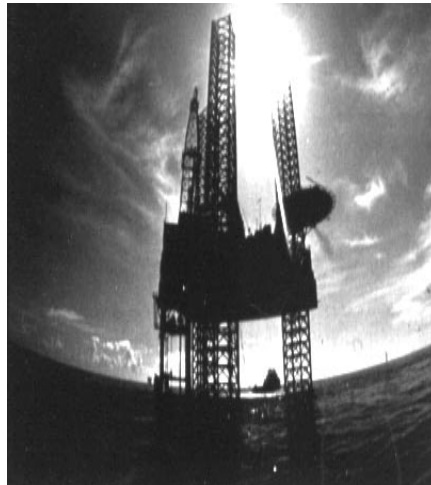




PLC BASIC Module

(Cat. No. 1771-DB, Series B)

Product Data



The PLC[®] BASIC module occupies one slot in the 1771I/O chassis and runs user-written BASIC and C programs independently of your PLC processor to provide an easy, fast interface between a PLC processor, the 1771 I/O backplane and RS-232, -422, and -485 devices. The BASIC module can also communicate with a remote SLC[™] processor or a remote device on the DH-485 network. Using the BASIC module you can:

- communicate with applications requiring remote communications such as computers, modems, printers and other third-party devices
- manipulate and analyze input and output information gathered from the PLC processor
- calculate complex math or application-specific algorithms, helping conserve valuable PLC program memory
- generate unattended reports

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Benefits

Shorten Your Processing Time. Now you can program and run BASIC programs faster than ever. The 1771-DB/B BASIC module operates four plus times faster than before. With a C tool kit and C compiler from one of our Pyramid Solutions Program Partners, you can run C programs on the BASIC module even faster. See your Allen-Bradley representative for more details on the C tool kit. You can also run the BASIC module at the same speed as the Series A BASIC module for applications that cannot run at a faster speed.

With the BASIC Development Software (1746-PBASE) you can shorten program development time. This powerful programming tool provides a high level BASIC programming language, powerful debugger, ASCII terminal emulator, and a thorough Help system to streamline BASIC module programming and troubleshooting.

Improve Troubleshooting Efforts with New LED Indicators.

The Series B module has an additional five LED indicators to aid in your trouble-shooting efforts. You now have LED indicators to let you know when PRT1 is transmitting, PRT2 is transmitting, PRT1 is receiving, and PRT2 is receiving. In addition, you have two user-defined LED indicators.

Three Fully Functional Serial Ports Provide Interfaces between Your Process and the PLC Processor. The BASIC module has three serial ports for independent communication links:

- DH485 – use this port as a DH-485 network port or a programming port
- PRT1 – use this port as a program port or an ASCII port. You can configure PRT1 for RS-232, RS-422, or RS-485 communications.
- PRT2 – use this port as an ASCII port or a DF1 protocol port. You can configure PRT2 for RS-232, RS-422, or RS-485 communications.

Program Serial Communications Easily. With the BASIC module's new enhanced serial port statements (EOF, INPS, INPL) and port statement modifiers (# and @) serial communications program development becomes easy. When you use the @ operator you direct communications to port PRT1. When you use the # statement modifier you direct communications to port PRT2. It's that simple.

Complement PLC Ladder Logic with a Familiar Programming Language.

The BASIC module uses a subset of the Intel™ BASIC 52 programming language. The module supports the BASIC commands and statements you are familiar with along with an additional 128 calls specific to the BASIC module, including 43 new calls. Your programs run asynchronously to and independently of the PLC control logic, but have access to the PLC processor's memory. You can use PLC control logic programs to start and stop your BASIC programs.

Perform Operations in Background While a BASIC Program Executes.

Perform such operations as reading bar code data or writing to a remote display device at the same time your BASIC program executes. You can do just that with the newly added BASIC calls:

CALL 33	transfer data from PRT1/PRT2 to BTR buffer
CALL 34	transfer data from BTW buffer to PRT1/PRT2
CALL 49	read remote DH-485 SLC data file
CALL 50	write to remote DH-485 SLC data file

Examine Bits 10–17 for Communication Port Status. With the BASIC module configured for 16-bit operation you can examine bits 10 – 17 for communication port status. These bits are especially useful in these newly added calls:

CALL 32	enable/disable processor interrupt
CALL 33	transfer data from PRT1/PRT2 to BTR buffer
CALL 34	transfer data from BTW buffer to PRT1/PRT2
CALL 49	read remote DH-485 SLC data file
CALL 50	write to remote DH-485 SLC data file
CALL 118	PLC/SLC unsolicited writes
CALL 122	read remote DF1 PLC data file
CALL 123	write to remote DF1 PLC data file

When the BASIC module is configured for either 8-bit or 16-bit operation, bits 1–8 in both the input and output image tables are used for block transfer.

Configuration:	Input image bits	Output image bits	Read block words	Write block words
8-bit	8	8	64 max	64 max
16-bit①	16	16	64 max	64 max

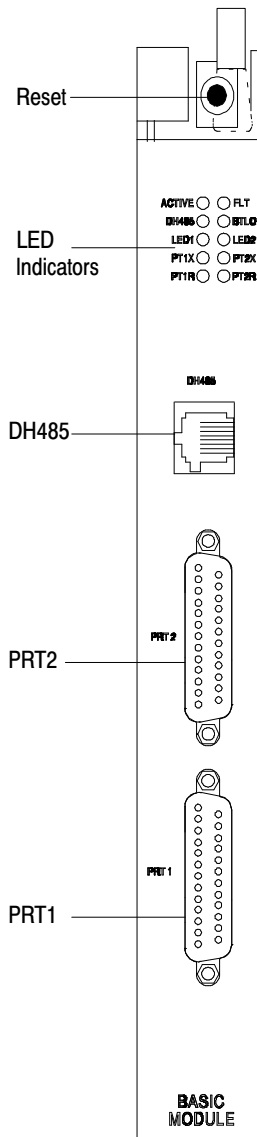
① 2-slot chassis addressing not allowed. Block transfers must be synchronous.

Communicate To One or More PLC Programmable Controllers.

You can communicate to PLC processors across the 1771 I/O backplane or to a remote SLC processor or remote device on the DH-485 network through the DH485 port.

Use DF1 Protocol To Communicate Using a Modem. You can configure port PRT2 for DF1 protocol. You can implement the DF1 protocol in full-duplex or half-duplex mode. With the DF1 protocol you can communicate with remote devices using, for example, a leased phone line, radio link, or dial-up modem.

Features



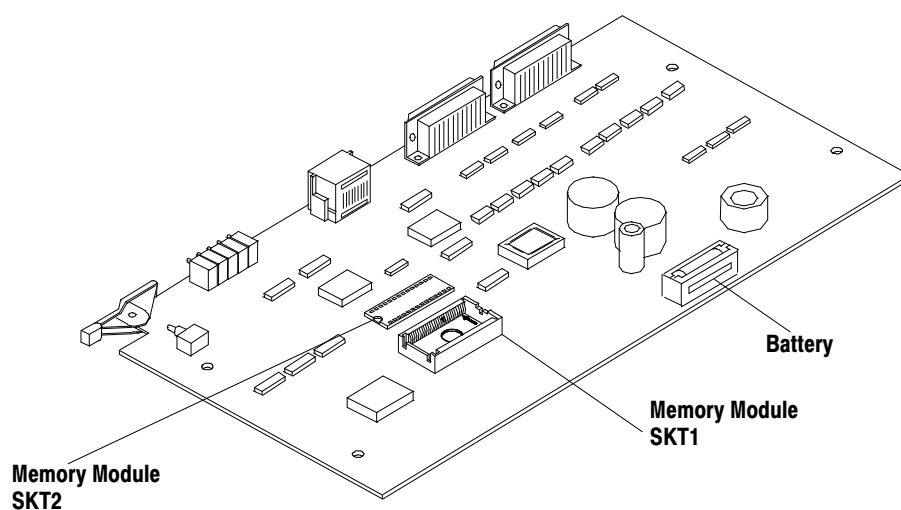
The BASIC module is a single-slot module that resides in an I/O chassis. The BASIC module provides math functions, report generation and BASIC language capabilities for any Allen-Bradley processor that communicates with the 1771 I/O system using block-transfer.

Hardware Features

Hardware element	Description
Reset switch	When you press this switch (located behind the module ejector tab), the BASIC module initiates a full reset. The BASIC module reacts to this reset the same as it does when you turn on power to your I/O chassis backplane.
LED Indicators	10 LED indicators for module diagnostics and operator indicators. <ul style="list-style-type: none"> 8 pre-defined LED indicators 2 user-defined LED indicators
DH485 port	This RJ-45 port (DH485) provides communication over the DH-485 network. Use DH485 port to interface the BASIC module with the DH-485 network. This port is not isolated and cannot directly drive the DH-485 network. You must use a 1747-AIC link coupler to link port DH485 with the DH-485 network. You can also use this port as a program port.
PRT2 port	This independently configurable, isolated 25-pin D-shell serial port provides RS-232, RS-422, and RS-485 communication with I/O devices. Use PRT2 to interface the BASIC module with user devices or a modem using DF1 protocol. PRT2 provides DF1 full-duplex or half-duplex slave protocol for SCADA applications. PRT2 is capable of operating full-duplex at 300, 600, 1200, 2400, 4800, 9600, and 19200 bit/s. It is electrically isolated to 500V dc.
PRT1 port	This independently configurable, isolated 25-pin D-shell serial port provides RS-232, RS-422, and RS-485 communication with I/O devices. Use PRT1 to interface the BASIC module with user devices. PRT1 is capable of operating full-duplex at 300, 600, 1200, 2400, 4800, 9600, and 19200 bit/s. It is electrically isolated to 500V dc. You can also use this port as a program port.
RAM	24K bytes of battery backed RAM for storage of user programs and data
Battery backup	<ul style="list-style-type: none"> battery-backed, 24-hour clock/calendar capacitive backup of RAM during battery change
Memory module	<ul style="list-style-type: none"> socket for standard EEPROM and EPROM memory modules with carriers socket for standard EEPROM and EPROM memory modules without carriers on-board program EEPROM storage
User-accessible free-running clock	5 ms resolution
User-accessible wall clock/calendar	1 s resolution
Backplane interface	<ul style="list-style-type: none"> 1771 I/O supports block-transfers multiple BASIC modules can reside in the same I/O rack and function independently of each other

Software Features

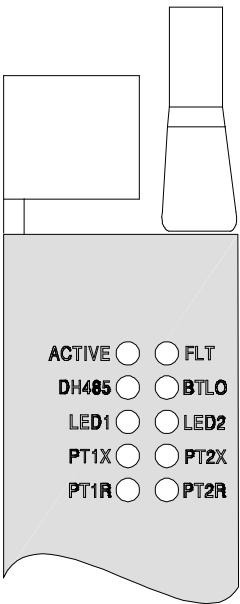
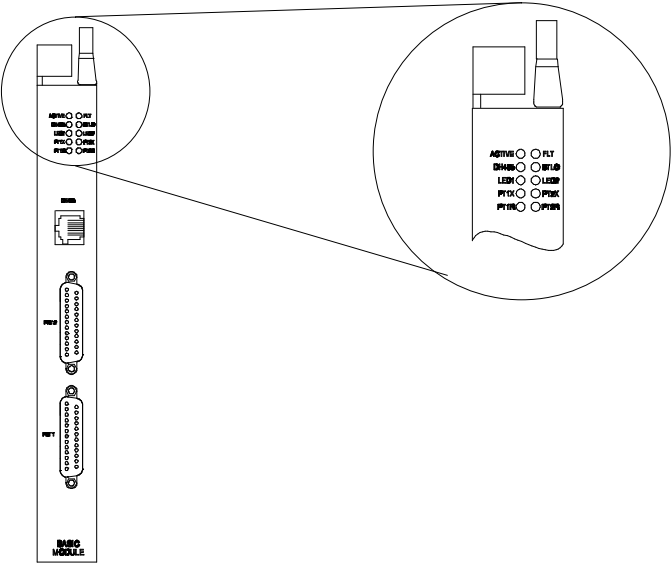
Software element	Description
Programming language	Intel BASIC-52 with enhancements <ul style="list-style-type: none"> • high-level math functions • full set of trigonometric instructions • string manipulation support • floating point calculations and conversions • extensive call libraries
Block transfer communication	data read and write support with: <ul style="list-style-type: none"> • PLC-2® family processors • PLC-3® family processors • PLC-5® family processors • PLC-5/250™ family processors
Program and data storage options	<ul style="list-style-type: none"> • RAM • memory modules
Communication network support	<ul style="list-style-type: none"> • DH-485 network • DF1 protocol
Data type generation	<ul style="list-style-type: none"> • 16-bit binary (4 hex digits) • SLC 16-bit signed integer • SLC 16-bit unsigned integer • 3-digit, signed, fixed decimal BCD • 4-digit, unsigned, fixed decimal BCD • 4-digit, signed, octal • 6-digit, signed, fixed decimal BCD • 3.3 digit, signed, fixed decimal BCD • 32-bit IEEE PLC-5 floating point



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Diagnostics

The BASIC module has 10 indicator LED indicators. Use these LED indicators for diagnostics and operator interface indicators.

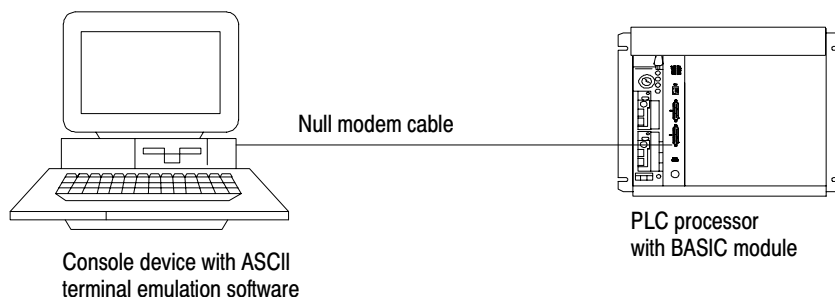


LED	Indication
ACTIVE	Indicates the module mode and whether the BASIC module is receiving power from the backplane.
FLT	Indicates whether a system power failure was detected during background diagnostics.
DH485	Indicates whether port DH485 on the BASIC module is active for communication.
BTLO	Indicates whether the voltage of the battery that backs up RAM is low.
LED1	User definable. LED activated through the user program.
LED2	User definable. LED activated through the user program.
PT1X	Indicates whether port PRT1 on the BASIC module is transmitting signals.
PT2X	Indicates whether port PRT2 on the BASIC module is transmitting signals.
PT1R	Indicates whether port PRT1 on the BASIC module is receiving signals.
PT2R	Indicates whether port PRT2 on the BASIC module is receiving signals.

Program the BASIC module using a subset of the Intel BASIC 52 programming language. You can program the BASIC module using an ASCII terminal or a personal computer running ASCII terminal emulation software. Allen-Bradley terminal emulation software, the BASIC Development Software (catalog number 1747-PBASE) package, was designed especially for programming the BASIC module. The execution of these programs allow a direct interface with programmable controller ladder logic programs. You can store and execute programs in RAM or in a memory module. You can store one program in RAM and up to 255 independent user-programs in memory module memory.

ASCII Terminal Interface

Use an ASCII terminal to enter a BASIC program one line at a time to your BASIC module through port PRT1. The ASCII terminal connected to the BASIC module must be an industrial terminal, workstation, or personal computer that communicates in alphanumeric mode. An ASCII terminal can also be used to display charts or graphs generated by your BASIC program.



In this configuration, you connect the RS-232 port on the back of your industrial terminal or personal computer to port PRT1 on your BASIC module. Port PRT1 must be configured as the program port.

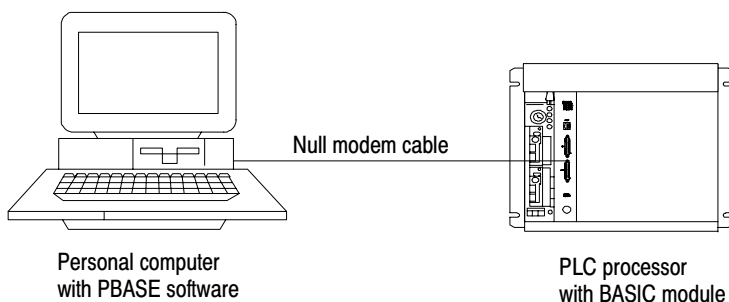
Programming Interfaces

BASIC Development Software

Use a personal computer with the BASIC Development Software (PBASE) to create a BASIC program that is then downloaded to the BASIC module. PBASE provides an efficient means to edit, compile, upload, and download BASIC programs to the BASIC module. You can use PBASE with either the RS-232 or the DH485 interface. You must use PBASE software when port DH485 is the program port.

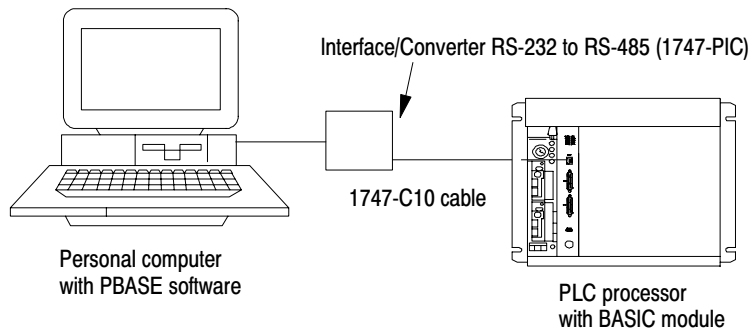
RS-232 Interface

In this configuration, you connect the serial port on the personal computer to port PRT1 on the BASIC module. The personal computer communicates with the BASIC module through terminal emulation over an RS-232 interface. Port PRT1 is configured as the program port.



DH-485 Interface

In this configuration, you interface the serial port on the personal computer with port DH485 on the BASIC module through a 1747-PIC Interface/Converter. The 1747-PIC Interface/Converter converts the RS-232 signals from the personal computer RS-232 serial port to RS-485 format. Port DH485 is configured as the program port.



Your BASIC module may communicate with a DH-485 network. It can also communicate with a remote device through a modem using the DF1 protocol. When using DF1 protocol on port PRT2, port DH485 is disabled.

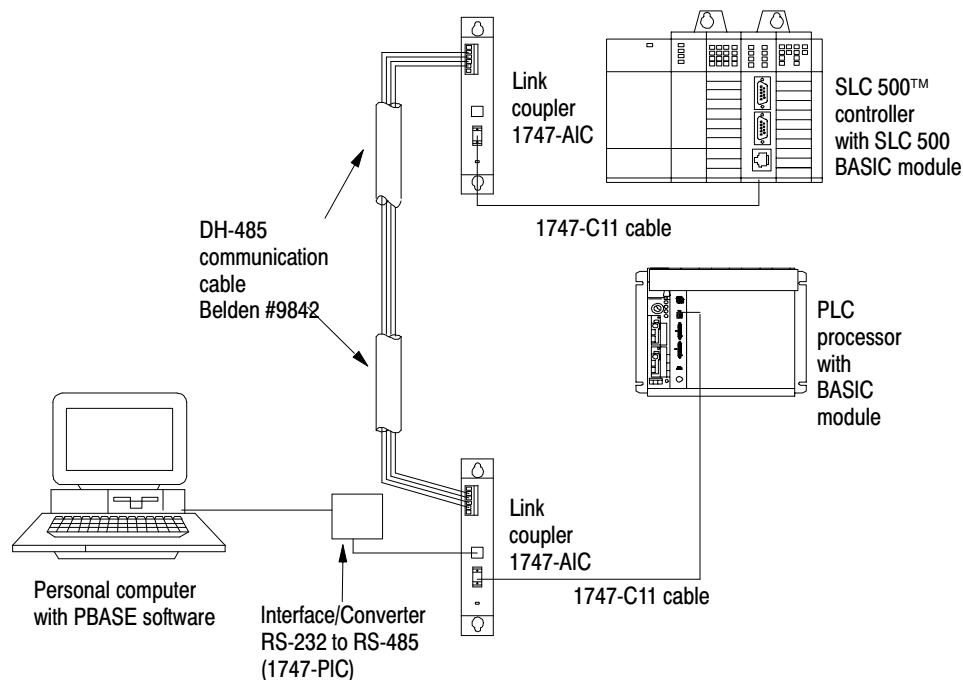
Network Configurations

DH-485 Network Configuration

1747-PIC Interface/Converter/1747-AIC Link Coupler Configuration

In this configuration the BASIC module interfaces with a DH-485 network through a 1747-PIC Interface/Converter and a 1747-AIC isolated link coupler.

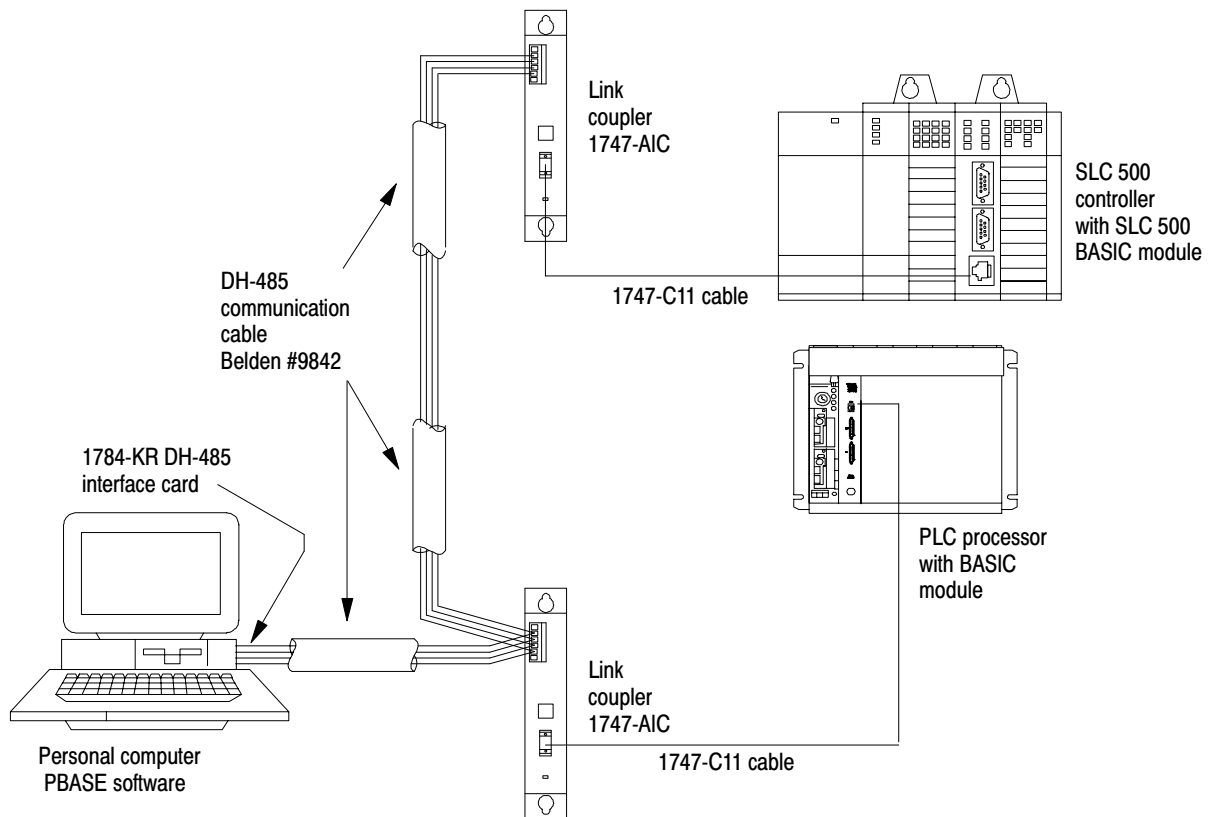
The 1747-PIC interface/converter converts the RS-232 signals from the personal computer RS-232 serial port to RS-485 format. The 1747-AIC link coupler links the converted signals with the DH-485 network and port DH485 on the BASIC module. The 1747-AIC link coupler also provides an interface to the DH-485 network for a personal computer with the BASIC development software. Port DH485 must be configured as the program port in order to communicate with PBASE software via the DH-485 network.



Important: Each BASIC module requires a link coupler port to interface it with the DH-485 network.

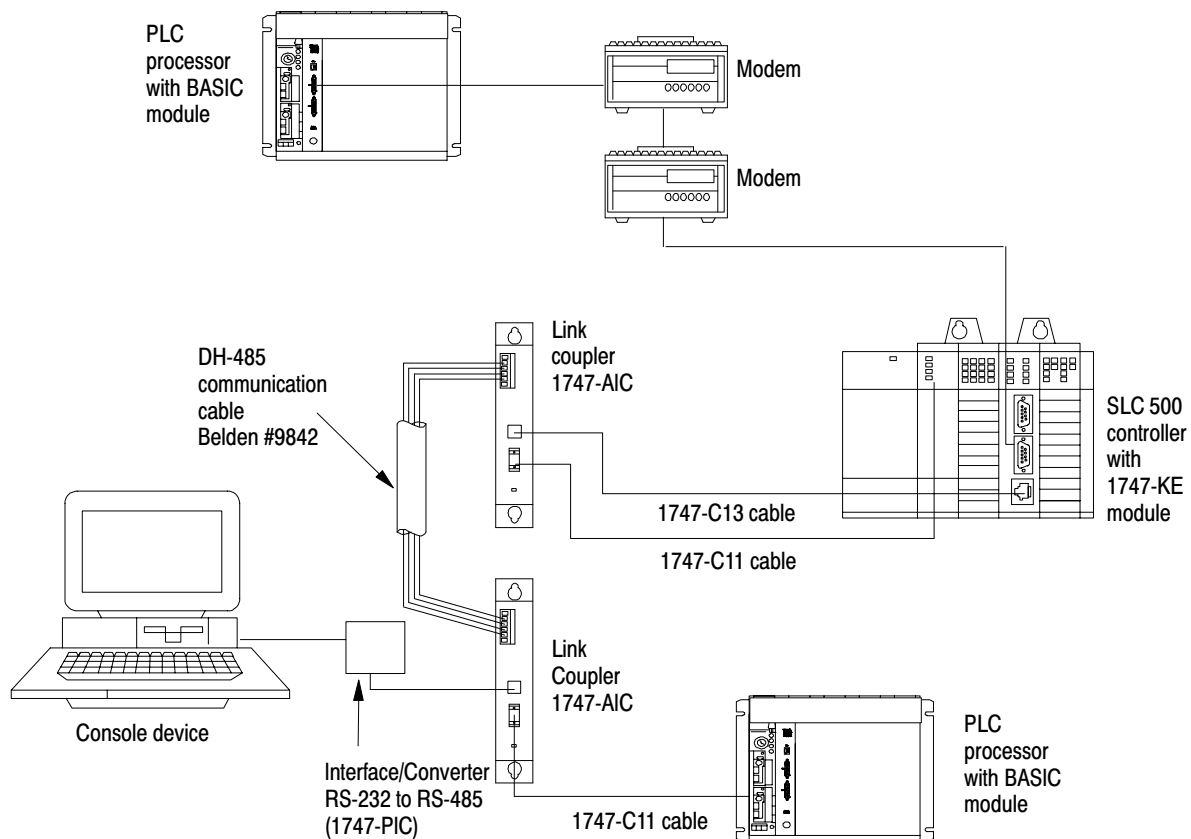
1747-AIC Link Coupler/1784-KR DH-485 Interface Card Configuration

This configuration shows the BASIC module interfaced with a DH-485 network through a 1747-AIC link coupler. The link coupler provides an interface to the DH-485 network for a personal computer with the BASIC development software. In this configuration, a 1784-KR DH-485 Interface Card is installed in the personal computer.



DF1 Protocol Configuration

The BASIC module can use DF1 to control communications with a modem. In this configuration, the BASIC module is interfaced with a DH-485 network through a peer-to-peer communication interface with full-duplex, DF1 protocol.



Specifications

Environmental Conditions

Condition	Range
Operating temperature	0° C to 60° C (32° F to 140° F)
Storage temperature	-40° C to 85° C (-40° F to 185° F)
Relative humidity	5% to 95% (non-condensing)

Memory Requirements

Memory Type	Size	
RAM (stores BASIC programs and protected variables)	24K byte battery-backed	
optional non-volatile memory modules (stores BASIC programs and port configuration)	8K byte EEPROM	(programmable with 1771-DB/B)
	32K byte EEPROM	(programmable with 1771-DB/B)
	8K byte EPROM	(pre-programmed with external PROM programmer)
	16K byte EPROM	(pre-programmed with external PROM programmer)
	32K byte EPROM	(pre-programmed with external PROM programmer)

Power Consumption

Operating Voltage	Current Requirement
5V dc	.75 A

Important: The BASIC module receives its power from the 1771-I/O backplane. The power consumption of the BASIC module must be taken into consideration when planning your PLC system. Refer to the documentation supplied with your PLC processor or 1771-I/O equipment for additional information on power supplies and current requirements.

Port Driver and Receiver

Drive Output	Receiver Sensitivity
+3.6 V minimum	200 mV minimum

Port Isolation

Port	Isolation	Isolation Voltage
PRT1	Backplane to Port	500V dc
PRT2	Backplane to Port	500V dc
PRT1 and PRT2	PRT1 to PRT2	500V dc

Important: Port DH485 is not isolated.

Clock/Calendar Accuracy

Specification	Range
accuracy	± 1 minute/month @ 25° C + 0, - 6 minute/month @ 60° C

Math

Precision	Range
8 significant digits	$\pm 1\text{E}^{-127}$ to $\pm .99999999\text{E}^{+127}$

Maximum Communication Distances

Communication Rate (bit/s)	Maximum Distance Allowed m (ft)			
	RS-232	RS-423	RS-422	RS-485
300	15 (50)	15 (50)	1230 (4000)	1230 (4000)
600	15 (50)	15 (50)	1230 (4000)	1230 (4000)
1200	15 (50)	15 (50)	1230 (4000)	1230 (4000)
4800	15 (50)	15 (50)	1230 (4000)	1230 (4000)
9600	15 (50)	15 (50)	1230 (4000)	1230 (4000)
19200	15 (50)	15 (50)	1230 (4000)	1230 (4000)

Ordering Information

Related Products

Product	Catalog number
8K byte EEPROM memory module (supports turbo speed)	1771-DBMEM1
8K byte EEPROM memory module (supports normal speed only)	1747-M1
32K byte EEPROM memory module (supports turbo speed)	1771-DBMEM2
32K byte EEPROM memory module (supports normal speed only)	1747-M2
8K byte EPROM memory module (supports normal speed only)	1747-M3
32K byte EPROM memory module (supports normal speed only)	1747-M4
BASIC Development Software	1747-PBASE
communication cable (72" length, interchangeable with C-11 and C-20 cables)	1747-C10
communication cable (12" length, interchangeable with C-10 and C-20 cables)	1747-C11
communication cable (100" length, interchangeable with C-10 and C-11 cables)	1747-C20
communication cable (36" length, different from C-10, C-11, C-20 cables)	1747-C13
personal computer to DH-485 interface card	1784-KR
interface/converter (RS-232 to RS-485)	1747-PIC
link coupler	1747-AIC

The C tool kit is available from one of our Pyramid Solutions Program partners (see Pyramid Solutions Program Product Directory, PSP-5.1).

For additional information on these products, refer to your local Allen-Bradley sales office.

Related Publications

Publication	Publication number
BASIC Module User Manual	1771-6.5.113
BASIC Development Software Programming Manual	1746-6.2
SLC 500 BASIC Module and BASIC Development Software Product Data	1746-2.33

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